**CS 535: Homework 1**

**Teammates:** Achyut Shukla, Aparna Anand, Madhusudhan Krishnamachari

**Question 1:**

We observed the following in the videos:

* Usage of certain words, taking context into consideration as well, heavily swayed the opinion to one side. For example, words like hate, love were not used in a sarcastic manner but were used to convey the actual positive or negative emotions. In other scenarios, people could use these words in sarcastic manners but this was not observed in these videos.
* People tend to use hand gestures to accompany their speech but these gestures rarely had any significance on their own. It was used as a medium to express themselves better.
* It was observed that the voice pitch changed when people wanted to express a positive or negative emotion when they had a neutral pitch seconds before. Their pitch changed when their emotion changed from neutral to positive/negative.
* People tend to smile or laugh when expressing positive emotions. This was observed in most (though not all) of the cases when people smiled.
* In many videos, it was observed that subjects’ eyes widened and their eyebrows got raised when they expressed positive emotions.
* When expressing negative emotions, particularly anger or annoyance, people frowned, their eyebrows moved inward, they clenched their teeth, stressed some word syllables and sometimes, even used profanity.

**Question 2:**

The nominal Krippendorff’s Alpha value is 0.5845. If the alpha value is >= 0.8, then it is considered reliable. If 0.8 > alpha >= 0.667, we can draw tentative conclusions about agreement. Anything less than 0.667 should be discarded is the general rule of thumb. So, if we go with the general guideline, this alpha value is not reliable. However, our alpha value still provides some information about inter-rater agreement. We observe that at least two of the raters agree for most segments. However, there are times when all three of them completely disagree with each other or all three of them completely agree with each other.

**Question 3:**

We picked five behavioral cues. The visual cues picked were mouth openness, right eye openness, smile intensity and face up down level. The acoustic cue picked was NAQ.

As NAQ refers to tenseness in voice, we hypothesized that a person would be more lax, and not tense while exhibiting negative emotions. The reason behind being, one tends to mumble out words loosely when they are sad or depressed, while they would be more tense with their pronunciation if they were happier. From the boxplots and ANOVA test, we find that the NAQ gives an extremely really low value of p=0.000266 and shows progressively higher median values for negative to positive with positive having more higher values as well.

Just like NAQ, mouth openness seemed like a more positively connotated feature. A happy/excited person would open their mouth more while talking. We notice that ANOVA and the boxplots correlate with our opinion with a low p value of 0.007821 and very similar boxplots as NAQ – progressively higher median values and higher values in positive in comparison to negative. For right-eye openness, we took into consideration eyes in general and observed that eyes tend to be widened while exhibiting more positive emotions. This hypothesis was more or less validated by our analysis. ANOVA gave a p value although not lesser than 0.05, was still quite low (0.154573). The boxplots show that the median is highest for positive and also 50% of the data is nicely spread over the larger values; this was more than neutral and negative. Next, we looked at the smile intensity. As per our observations, smile signified positive emotions more as we felt there was no sarcasm involved. Unfortunately though, the ANOVA results gave a very high p value of 0.685063. The boxplots show that the medians don’t follow any pattern and are highest for neutral. But, we find that for positive the points go higher showing that high intensity smiles can be used to show positive emotions. Finally, we observed that face up would display more confidence and hence be more positive, while face down would display nervousness or even sadness and hence be associated with negative emotions. But the ANOVA showed an extremely high value of p (0.921035). Also the boxplots showed that the medians did not follow any pattern, with highest being for neutral. In fact, the boxplots show that higher values (faced up) are present for negative emotion which is the opposite of our observations.

As the first three features (NAQ, mouth openness and right eye openness) gave very good values and validated our hypothesis, we understand that they are good features that can be used to identify emotions well, while with the last two (smile intensity and face up down), we can’t say anything about the state of emotion as they can be used more widely across all emotions.